

HADROMASTAX MERGA, A NEW GENUS AND SPECIES
OF MARINE ISOPOD CRUSTACEAN (LIMNORIIDAE)
FROM SOUTHEASTERN AUSTRALIA, WITH
DISCUSSION ON THE STATUS OF THE FAMILIES
KEUPHYLIIDAE AND LYNSEIIDAE

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Abstract.—*Hadromastax merga* is described and placed in the Limnoriidae. The genus has a morphology atypical for the Limnoriidae as the family has previously been defined, with only two pleonites visible dorsally (these forming a pair of backwardly-directed processes), massive mandible with a conical incisor, anterolateral uropods forming a tail fan and a posteriorly truncate pleotelson. Discussion is given on characters used to define Limnoriidae and the related families Keuphyliidae and Lynseidae.

Hadromastax was collected from a depth of 155 meters off Newcastle, New South Wales, Australia.

The Flabellifera now comprises 14 recognized families. The list given by Bowman and Abele (1982) is now dated, and the currently accepted number of families is one less than was listed. The families Alcironidae, Argathonidae, and Excorallanidae are all synonyms of Corallanidae (see Bruce et al. 1982); Bathynomidae and Eurydicidae are synonyms of Cirolanidae (see Bruce 1986); Anciniidae is a synonym of Sphaeromatidae (see Iverson 1982). Table 1 includes all the families of the Flabellifera with an approximate assessment of their size. Half of these families are "small," with less than 10 species, and of these only one, the Bathynataliidae (see Bruce 1985) contains more than a single genus. Four of the "small" families are monotypic (see Table 1).

Two recently established monotypic families (Keuphyliidae Bruce, 1980, and Lynseidae Poore, 1987) show close affinities to the Limnoriidae. The new genus described here could, on some grounds, also be established as a new family. The traditional characters used to define the Limnoriidae are absent, and it is abundantly distinct from all other flabelliferan families. As indicated

in the discussion, the new genus seems better retained within the Limnoriidae.

Family Limnoriidae Dana, 1853
Hadromastax, new genus

Diagnosis.—Cephalon freely articulating, not immersed in pereonite 1. Coxae present on pereonite 1; posterior margins of coxae of pereonites 1 and 2 concealed by anterior margin of next coxae. Pleon with 2 pleonites visible in dorsal view, 4 pleonites visible in ventral view; 2 dorsally visible pleonites forming 2 united posteriorly directed processes. Pleotelson with posterior margin truncate.

Frontal lamina and clypeus absent, labrum present. Mandible massive, incisor conical, heavily sclerotized; palp 3-articled, small, about 0.2 length of mandible; lacinia mobilis represented by single seta. Maxillule, medial lobe with 3 elongate blade-like spines projecting medially and one short stout spine projecting anteriorly. Maxilliped, endite without coupling hooks. Antennular and antennal bases not contiguous. Uropod peduncle posteromedial margin

Table 1.—Families of the Flabellifera, with an indication of their approximate size.

Aegidae Leach, 1815	5 genera, 100+ species
Anuropidae Stebbing, 1893*	1 genus, 7 species
Bathynataliidae Kensley, 1978	3 genera, 3 species
Cirolanidae Dana, 1853	45+ genera, 400+ species
Corallanidae Hansen, 1890	6 genera, 60+ species
Cymothoidae Leach, 1818	40+ genera, uncertain number of species
Keuphyliidae Bruce, 1980	1 genus, 1 species
Limnoriidae Dana, 1853	3 genera, 60+ species
Lynseidae Poore, 1987	1 genus, 1 species
Phorotopodidae Hale, 1925	1 genus, 1 species
Plakarthriidae Richardson, 1904	1 genus, 1 species
Serolidae Dana, 1852	3 genera, 80+ species
Sphaeromatidae Edwards, 1840	80+ genera, 500+ species
Tridentellidae Bruce, 1984	1 genus, 11 species

* The correct spelling, see Bacescu and Holthuis (1983) and Anonymous (1985).

produced, endopod articulating separately and posterior to exopod.

Type species.—*Hadromastax merga*, new species, by monotypy, and original designation.

Remarks.—This isopod is readily separated from all other Flabellifera by the unique pleonal structure, the two dorsal processes being formed by two interlocked pleonites, and by the separate articulation of the uropodal rami.

The morphology of the pleon, with the two posteriorly projecting pleonites, prevents observation of how the dorsal pleonites are arranged, but in lateral and ventral view it can be seen that the pleotelson is not fused to the pleon.

The presence of free coxal plates on pereonite 1 is sufficiently unusual within the Isopoda to preclude assessment of its significance. Wilson (1980) has shown that it may be present in certain Asellota in ovigerous females, and indicated the dangers of overinterpreting this character.

Etymology.—The name is derived from two Greek words *hadros* (well developed, strong) and *mastax* (jaws). Gender feminine.

Hadromastax merga, new species

Figs. 1–3

Material.—Holotype, female (non-ovig. 2.5 mm), off Newcastle, NSW, 33°06.2'S, 156°09.3'E, 7 Oct 1982, 154–165 m, coll. W. Ponder and R. T. Springthorpe on RV *Tangaroa* (AM P371144).

Description.—Female: Body about 2.2 times as long as wide, eyes lateral. Dorsal surfaces of pereonites 2–7 covered with small tubercles and scattered plumose setae; pereonites 2–5 each with medial transverse depression, posterior margins of pereonites 3–7 with acute denticles; anterior margin of coxae 2 and 4, posterior margin of coxae 3, 5–7 with small acute denticles. Pleon and pleotelson dorsal surfaces with small tubercles and scattered plumose setae; pleotelson anteriorly domed, posteriorly flat, with numerous plumose setae.

Antennule peduncle article 4 minute, with articulating brush-tipped seta; flagellum 2-articled, article 2 with single aesthetasc. Antenna slightly shorter than antennule, flagellum article 1 elongate, articles 2–4 short; distal margin of each flagellar article with 3 or 4 setae. Mandible massive, incisor pro-

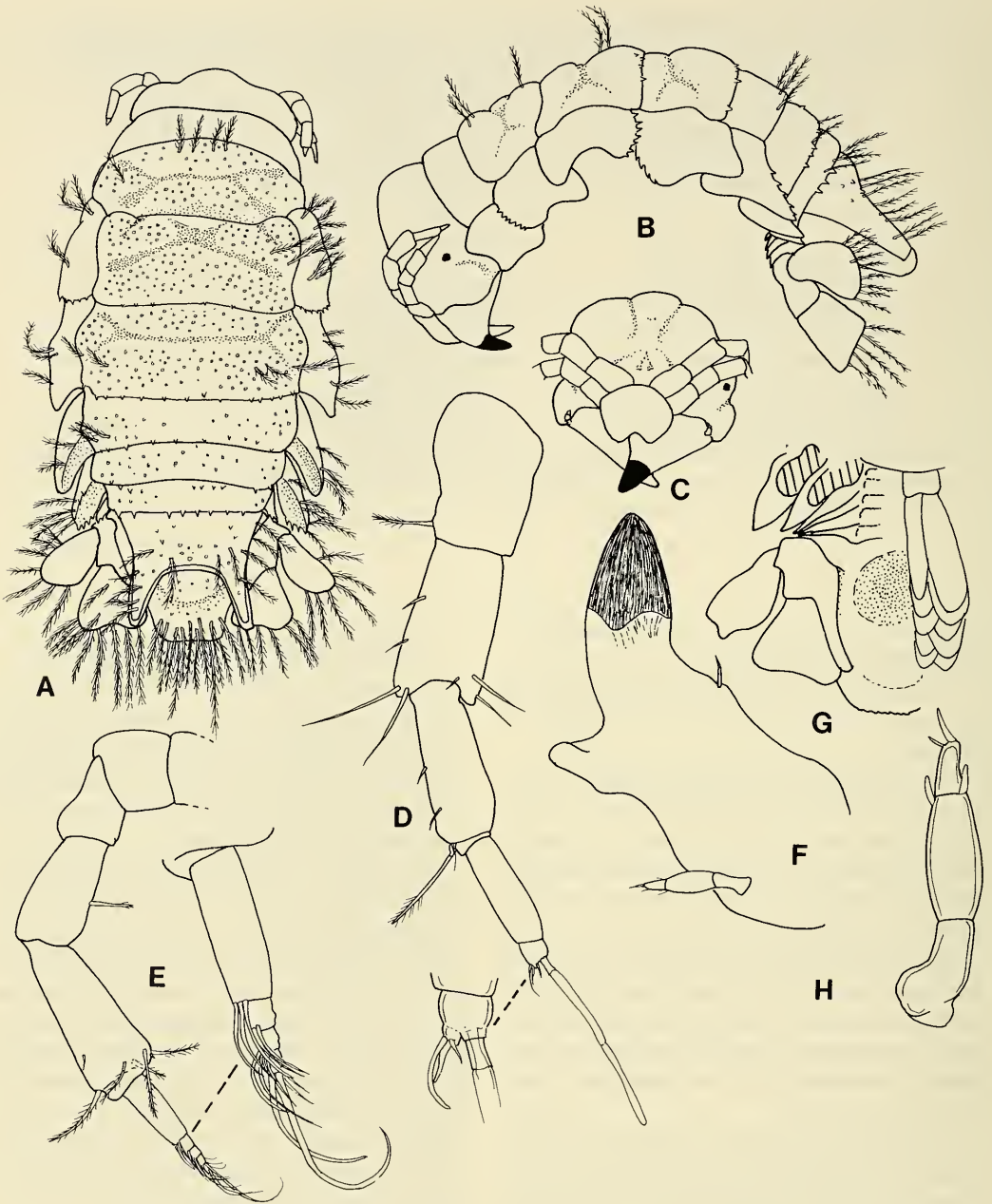


Fig. 1. *Hadromastax merga*, holotype: A, Dorsal view; B, Lateral view; C, Frontal view of cephalon; D, Antennule and detail; E, Antenna and detail; F, Right mandible; G, Pleon and pleotelson in ventral view, after dissection; H, Mandibular palp.

jecting well beyond labrum. Maxilliped palp article 2 with large plumose seta at mediobasal angle of article 2; article 3 with 3 plumose setae at mediobasal angle and 1

seta on lateral margin; article 4 with 3 plumose setae, and article 5 with 5 setae, one being plumose.

Pereopods 1–6 similar, pereopod 7 smaller

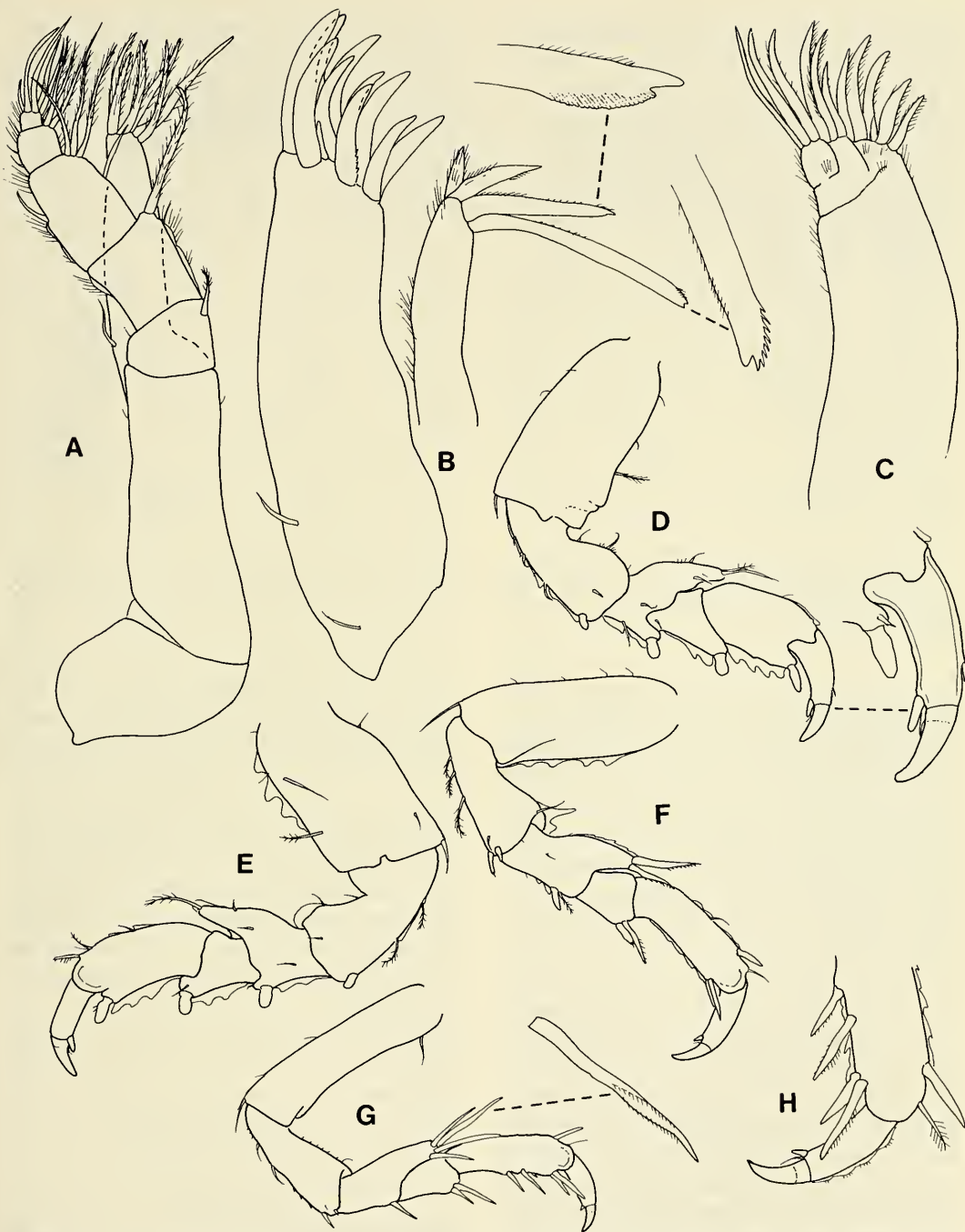


Fig. 2. *Hadromastax merga*, holotype: A, Maxilliped; B, Maxillule; C, Maxilla; D, Pereopod 1; E, Pereopod 2; F, Pereopod 6; G, Pereopod 7; H, Pereopod 7, dactylus.

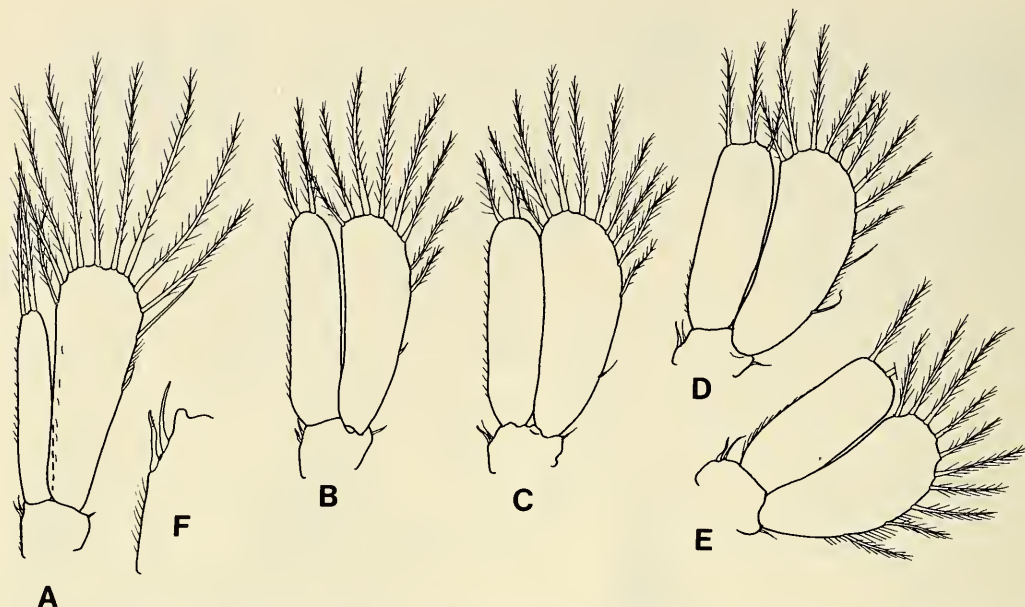


Fig. 3. *Hadromastax merga*, holotype: A-E, Pleopods 1-5, respectively; F, Pleopod 1, peduncle medial margin.

and more slender than 6. Pereopod 1 with large tubercular spine at posterodistal angles of ischium, merus, carpus, and propodus; anterodistal margin of merus produced, with 2 setae; posterior margins of all articles except basis with cuticular serrations. Pereopods 2-6 similar to pereopod 1, but becoming increasingly slender towards posterior; basis anterior margin with cuticular serrations.

Pleopod rami elongate, becoming wider from 1 to 5; all rami with marginal plumose setae; all endopods with 2 terminal setae except for pleopod 4 which has 3. Lateral and medial margins of rami of pleopod 1 straight; lateral margins of exopods of pleopods 2 to 5 becoming increasingly convex. Uropod rami with long plumose marginal setae; exopod subovate, inserted anterolaterally; endopod inserted mediolaterally and not overlapped by exopod, widening distally, posterior margin indented.

Male.—Not known.

Color in alcohol.—White, no chromatophores apparent.

Remarks.—The precise habitat of this species is unknown. Wolff (1979) discussed use of wood as food, refuge, or substrate for deep sea isopods (>1500 meters), and found it to be common in both the shallow and the deep sea. The massive mandible and lack of molar process, spine row, and vestigial lacinia mobilis is indicative of hard biting (see Dahl & Hessler 1982). *Hadromastax* may also feed on wood. Long setae and expanded uropods suggest that it is not a wood borer.

The species is known only from the type locality.

Etymology.—*merga* is a Latin word meaning a two-pronged pitchfork.

Discussion

Poore (1987), in establishing the family Lynseiidae listed the apomorphies that define the Limnoriidae. These were: "spherical mobile head; broad operculate pleotelson; four digestive caeca, and unilobed testis (Menziés 1957); and at least one claw-shaped

uropodal ramus." The state of the digestive caeca and testis is not known for most families, and comparisons are not possible. Of the remaining characters one claw-shaped uropod ramus is shared with the family Keuphyliidae; the broad operculate pleotelson (i.e., covering uropods) occurs in other families of Flabellifera, and a degree of cephalic mobility is seen in some cirolanids (e.g., *Eurydice*). This then leaves no unique apomorphies that define the Limnoriidae.

The synapomorphies given for Limnoriidae and Lynseiidae by Poore (1987) are cylindrical bodies (semicircular in cross-section is more precise) with freely articulating cephalon; and a strong secondary unguis on all pereopods. The latter character is strongly expressed in Lynseiidae, but in the Limnoriidae it is less well developed and differs little from that shown by the Keuphyliidae and many genera of Cirolanidae (e.g., *Excirrolana*, *Cirolana*, *Hansenolana*, see Bruce 1986) or Sphaeromatidae (e.g., all genera figured by Harrison & Holdich 1982, 1984). The synapomorphies are reduced to a single character: the freely articulating cephalon.

Body shape (flattened versus semicircular) is not acceptable as a family character, there being several currently accepted families in which both forms occur (e.g., commonly in the Cirolanidae and Sphaeromatidae). The variation in morphology of uropod rami displayed between Limnoriidae, Keuphyliidae, and Lynseiidae is entirely similar to that shown within the Bathynataliidae, and including *Hadromastax*, is similar to that shown by the Cirolanidae or Sphaeromatidae.

Comparing appendages between Limnoriidae, Keuphyliidae, Lynseiidae, and *Hadromastax* the following characters are essentially the same throughout: the antennule peduncle is short, with three articles, and a fourth fused article; the flagellum very short. The antennal peduncle has five articles, and a short flagellum. The mandible palp is present or absent in the Limnoriidae, absent in

Keuphyliidae and Lynseiidae, and present in *Hadromastax*. The mandibular incisor, lacinia mobilis, and spine row of Keuphyliidae and Lynseiidae fit within the range of morphology shown by the Limnoriidae. The maxillule has 8–10 stout spines on the lateral lobe, and 3–4 plumose spines on the medial lobe (except in *Hadromastax* where these are blade-like). The maxilla is similar throughout. The pereopods are all essentially similar, all having a prominent secondary unguis on the dactylus, pectinate spines and cuticular nodules or serrations (except that nodules and serrations are absent in the Keuphyliidae). The pleopods of limnoriids, Lynseiidae, and *Hadromastax* are all similar, and of the typical flabelliferan form. The pleopods of *Keuphylia* differ in having the medial margin of the peduncle produced. The uropods are similar throughout except for those of *Hadromastax* which show the plesiomorphic flabelliferan condition.

The morphological characters that unite *Hadromastax* with the Limnoriidae are: cephalon shape and articulation; antennule; antenna; mouthparts (except for the maxillule inner lobe spines, which are blade-like); pereopod morphology, and pleopod morphology. The characters which immediately separate *Hadromastax* from the other limnoriid genera are the large flat uropodal rami, narrow truncate pleotelson, and the reduced pleon with two large dorsal processes.

Among related isopods the group of families forming the Cirolanidae-Cymothoidae lineage are all defined by mouthpart characters. Other flabelliferan families utilize somatic characters (Sphaeromatidae, Serolidae), although recent work indicates that the mouthparts of these families could also be diagnostic (e.g., Harrison & Holdich 1984, and their works cited therein; Harrison & Poore 1984). In general, flabelliferan mouthparts are conservative and provide the most useful features for differentiating families. If a revision of the family

Limnoriidae is undertaken mouthpart morphology will probably yield the most informative characters for defining the family.

A similar situation existed with the family Corallanidae Hansen: the family Corallanidae contained four genera, and there were three other very closely related families. Bruce et al. (1982) attempted to introduce a diagnosis that was consistent with those for the larger flabelliferan families within the Cirolanidae-Cymothoidae lineage. These families, now synonymized, were all easily recognizable, but were based on characters that were clearly of generic significance.

Phycolimnoria clarkae Kensley & Schotte, 1987, has uropoda which are essentially identical to those of *Lyseia*. The presence of simple uropoda in a species that is inarguably a limnoriid further weakens the utility of that appendage in diagnosing the family Limnoriidae.

What is apparent is that the characters currently being used to define the Limnoriidae are not necessarily those of most phylogenetic value. The differences in pleopod, pleotelson, and uropod morphology of the families under discussion, in view of the variation shown in these structures in other flabelliferan families, are best regarded as being of generic value. The family Limnoriidae was revised by Menzies (1957), but this work is not comparable in descriptive detail to contemporary isopod taxonomy, and it is not possible to assess morphological variation within the family. Equally, it is not possible to provide a new family diagnosis without the detailed redescription of at least some representatives of the limnoriid genera. At this point I do not propose to unite the families Keuphyliidae and Lynseidae with the Limnoriidae, but place this new genus within the Limnoriidae. The resolution of the status of Keuphyliidae, Lynseidae and *Hadromastax* will only come about when the family Limnoriidae is revised.

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